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als charakteristisch für die Art die: Hyphae primaria simplex und den habitus cupressiformi hervor." I will venture to include Maire's name in the list of synonyms, since if our species is that described by this author, it must also be a synonym of Corda's species.

I may also add that Mons. le Prof. C. A. J. A. Oudemans, of Brussels, took our species for a republication of his, but in a subsequent letter notified me that he regarded ours (and his) as Corda's species, a judgment approved, so he stated, by the eminent mycologist Mons. P. A. Saccardo.

I am indebted to Professor Morgan and others for most of the items in the following which is perhaps the complete synonymy to the present time:

1. *Botryosporium pulchrum* Corda, *Prachtflora*, 1839.
2. *Botryosporium elegans* Corda, *Anleitung*. 1842.
3. *Cephalosporium elegans* Bonorden, *Handb.* 1851.
4. *Phymatotrichum pyramidale* Bonorden, *Handb.* 1851.
5. *Botryosporium pyramidale* Costantin, *Mus.* 1888.
6. *Botrytis longibrachiata* Oudemans, *Microm.* 1890.
7. *Botrytis* (*Polyactis*) *doryphora* Pound & Clements, *Bot. Surv. Nebr. III. Rep.* 1893. 1894. [*Phymatotrichum doryphora* Pound & Clements in herb.]
8. *Botryosporium pulchellum* R. Maire, *Bull. Soc. Sci. Nancy*, 1900.
9. *Cephalosporium dendroides* Ell. & Kellerm., *Jour. Mycol.* 1903.

PUCCINIA LATERIPES B. & RAV. AN AUT-EU-PUCCINIA.

W. A. KELLERMAN.

It has been assumed hitherto that the pycnidial and æcidial stages as well as the uredo and teleutospores, occurring on *Ruellia strepens*, were the polymorphic forms of one and the same species of *Puccinia*. Cultures were instituted to determine the correctness of this view.

In late winter at an opportune time roots of *Ruellia strepens* were removed to the greenhouse. Old stems and leaves infected with the Rust were at the same time afforded like opportunity to absorb heat which presumably would render the spores viable when wanted for inoculations. The experiments were carried on as related below.

After the plants had resumed their vegetative activity and shoots a few inches long had developed (March 5th), some soil together with the partially decayed leaves adjacent to the stems, exposed in the natural habitat all winter, was placed around and

in contact with them to induce natural infection (Expt. No. 79). It was presumed that the spores adjacent to the growing shoots might germinate and infect the host. Such proved to be the case. *Spermogonia* appeared at the base of the shoots in two of the pots March 23. A week later the characteristic *æcidia* appeared.

Artificial infection in the usual way was also practiced. The teleutospores exposed all winter on stems of *Ruellia strepens* were sown on plants in the greenhouse March 25 (Expt. No. 81). *Spermogonia* appeared April 2, and *æcidia* followed in abundance April 10. These were mainly on the upper leaves on which the sowings were made.

Æcidiospores obtained in Experiments 79 and 81 were used to inoculate plants of *Ruellia strepens* reserved for this purpose. This experiment (No. 138) was successful, in the usual time the uredospores and teleutospores appearing in great abundance. No plants besides those used in the above experiments, though adjacent, exhibited any of the stages of the Rust. From all of the foregoing it is experimentally demonstrated that this species is an *Aut-eu-puccinia*.

With the assistance of Mr. J. G. Sanders and Miss Clara G. Mark I am able to illustrate this species; see Plate II. A few notes are also added.

The pycnidia and *æcidia* on the stems cause usually a slight distortion, the tissues of the affected part of the host becoming slightly hypertrophied. Fig. 1 shows such a case; this was sketched from an artificially infected plant. The distortion in consequence of slight hypertrophy in leaves is much less except when the midrib is attacked—in which case the curvature may be greater than that of the stems. The affected areas of the leaves are usually more restricted; the spots are very irregular, mostly angular, usually 3-6 mm. in diameter, the border a greenish yellow. Those of the stem, petiole and midrib are mostly longer (6-15 mm.). The sori are a dirty red-brown color.

The *æcidiospores* are quite irregular in shape as shown in figure 4. They have thick walls, verrucose on the surface, and are reddish or yellowish-brown in color. A number of our recorded measurements are as follows: 33x15, 26x20, 25x18, 30x19, 24x18, 31x18, 25x20, 35x15, 36x13, 30x22, 30x20 μ .

The sori of the uredo and teleuto stages on the leaves are mostly circular or slightly irregular, $\frac{1}{2}$ -1 mm. diameter. They fuse in many cases to considerable extended areas. The sori on the stems are much larger.

The uredospores are brown, echinulate, slightly smaller than the *æcidiospores*, as these measurements show: 21x18, 21x16, 24x18, 24x16, 30x17, 25x15, 18x18, 25x18, 20x16, 24x17 μ . Numerous spores are shown in fig. 5.

The teleutospores are very dark brown (the sori appear black), thick-walled, verrucose, the pedicels 50-65 μ long and 5-8 μ wide. Some spores are shown in fig. 6. Recorded measurements mostly from material obtained by cultures are: 28x21, 26x15, 30x17, 30x18, 29x19, 27x18, 27x21, 28x18, 30x21, 27x18, 27x20, 27x19 μ .

Explanation of Plate II. *Puccinia lateripes* B. & Rav. Figs. 1-3 natural size; figs. 4-6 magnified 350 diameters. Fig. 1. Portion of stem from culture plant showing sori of pycnidia and aecidia on stem and leaves. Fig. 2. Leaf with uredo and some teleuto sori, obtained by cultures. Fig. 3. Leaf with teleuto sori collected preceding year. Fig. 4. Aecidiospores obtained by cultures. Fig. 5. Uredospores obtained by cultures. Fig. 6. Teleutospores.

THE ALTERNATE FORM OF *AECIDIUM HIBISCIATUM*.

W. A. KELLERMAN.

An enormous quantity of the *Aecidium* on *Hibiscus moscheutos* occurring on the margins of Buckeye Lake, a reservoir eight or nine miles long, located forty miles east of Columbus, afforded good opportunity to study its teleutosporic connection. Several Rusts were likewise very abundant in the immediate vicinity of the clumps of this host. It seemed at first necessary to regard the *Puccinia* on *Carex scoparia* as the alternate of the *Aecidium* but that is doubtless connected with a stage on *Erigeron*. Then *Uromyces burrillii* was considered in the case though abundant in a very few places on the Reservoir margins. Cultures instituted gave only negative results, and this clue was necessarily abandoned. Next it was concluded that since *Puccinia polygoni-amphibii* was present and immediately adjacent to most of the clumps of the *Hibiscus*, it might be the missing link, but unsuccessful cultures effectually demonstrated the erroneous supposition.

Success with cultures was attained at last when the next probability was more seriously laid hold of, namely, that *Puccinia muhlenbergiae* Arthur might be the teleutosporic stage in question. Host plants had been early placed in the green house, March 20, and tardily resumed active growth furnishing excellent host plants for the operations. Likewise the Rust was placed in the same congenial temperature and the pre-season experiments could then be carried on with assurance of success if the suspected connection was not improperly guessed.

Sowings were made April 24 (Exp. No. 146) on *Hibiscus moscheutos* using the teleutospores of *Puccinia muhlenbergiae*